2007-05888/

Fall, Vol. 23, No. 3 ISSN 1188-066X

1998

Contact

Now, What About the Networks of Centres of Excellence?

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In writing what follows, I am wearing the hat of Chair of the Steering Committee of the Networks of Centres of Excellence (NCE) program. The members are the presidents of MRC, NSERC, and SSHRC, and the Deputy Minister of Industry. Our job is to oversee the NCE program.

The NCE program is an extraordinarily successful Canadian innovation in the organization of research, now almost a decade old. It meets some needs unique to Canada, a country with a small population, widely dispersed institutions, and an abiding concern for regional capabilities. Researchers form a network to do research together, but they stay in their home institutions and provide expert advice locally. By forming a network they can assemble a critical mass of intellectual resources from across the nation, and that gives them the ability to make significant advances in complex and difficult problem areas.

The NCE program was launched as an experiment in the late 1980s. It proved to be very successful, and the Government of Canada made it permanent in February 1997. The annual NCE budget is now $47.4 million, and today there are 11 NCEs and a competition in progress to create some new networks.

The prototype of Canadian research networking is the Canadian Institute of Advanced Research (CIAR), which first demonstrated in the early 1980s that it was possible to carry on basic research of the highest international quality

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K1A 1H5

Conseil de recherches en sciences naturelles et en génie du Canada

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Contact is published by the Communications Division of the Natural Sciences and Engineering Research Council (NSERC), 350 Albert Street, Ottawa, Ontario K1A 1H5
Tel.: (613) 995-5992
Fax: (613) 943-0742

It is also published on the Internet at http://www.nserc.ca/publicat.htm.

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NSERC is the national instrument for making strategic investments in Canada's capability in science and technology. An arm's-length federal agency, it is responsible for promoting and supporting research in the natural sciences and engineering, other than the health sciences.

NSERC supports both basic university research through research grants and project research through partnerships of universities with industry, as well as the advanced training of highly qualified people in both areas.

Strategic Planning Exercise Under Way

Dr. Douglas Barber, a member of Council and President of Gennum Corporation, has agreed to chair a task force that will lay out directions for NSERC over the next five years. The exercise will take into account the many changes in the research and funding environment since the publication in 1994 of the Council's strategy, *Partnerships in knowledge: Maximizing the investment in university research.* Dr. Barber and a small group of Council members met in early September to prepare the groundwork for a half-day strategy session during the Council meeting to be held in Calgary October 19 and 20. Following this meeting, a full complement of task force members will be appointed and the task force will begin its work.

Watch for news in future issues of Contact.

A Strategy Primer

How will the Strategy fit in with NSERC's mandate and the government's overall S&T strategy?

This exercise is primarily a review of NSERC's strategic directions in light of changes in the research environment. The federal S&T strategy sets out three related goals for building a strong, forward-looking, dynamic Canadian innovation system: sustainable job creation and economic growth, improved quality of life, and advancement of knowledge. NSERC is committed to these goals and is working towards them within the Industry Canada Portfolio's Action Plan.

Why should NSERC review its strategy when key decisions – for example, in the reallocations exercise and 1998 budget initiatives – have already been made?

While each decision is important to NSERC and its investments, collectively they do not constitute a strategy. A comprehensive, forward-looking analysis is needed to review these decisions in the context of the other challenges facing the research community, industry, government, and young people.

What was accomplished by the last strategy?

The last Strategy set about to build on the strengths of the funding system, and optimize the use of public funds for research. This goal was to be accomplished by emphasizing:

- Research alliances with industry and other partners, including international partners;
- Exposure of students to the research environment in other sectors, as well as to interdisciplinary research;
- Improved communications among university researchers, the public, and the user sector.

Some key results were:

Basic Research

- The Research Grants budget was protected, even when the overall NSERC budget declined;
- Collaboration and interdisciplinary research were promoted in NSERC literature;
- Applicants were encouraged to outline their research in plain language.

Equipment Grants

- The Major Facilities Access program was implemented and the equipment budget kept stable;

Project Research

- Project-oriented research programs were grouped into a single Research Partnerships Program that helped build new links between university and other sectors and emphasized participation by small businesses;

- The Technology Partnerships Program was implemented;
- NSERC undertook a pilot study to develop performance indicators for the Collaborative Research & Development (CRD) program. The pilot study surveyed university and industry CRD partners and will help track the partnerships and satisfaction levels.

Support for Students and Research Training

- NSERC held workshops on the Needs of the Next Generation of Researchers (fall 1996 and 1997);
- Selection committee and panel guidelines were revised to ensure support for new applicants;
- Annual surveys were used to track scholarship holders;
- NSERC increased opportunities for students to interact with industrial researchers through its Industrial Postgraduate Scholarships, Undergraduate Student Research Awards in Industry, and Research Partnerships programs, as well as through the Networks of Centres of Excellence (NCE) program;
- Selection criteria used to assess contributions to the training of highly qualified people were revised to include undergraduate training.

Other Accomplishments:

- Performance frameworks and indicators were developed;
- NSERC set up a Task Force on Intellectual Property, and helped establish a venture capital fund – the Canadian Science and Technology Growth Fund;
- In collaboration with The Conference Board of Canada, conferences were organized to help transfer knowledge outside academe, and the University-Industry Synergy R&D Partnerships Awards were created to recognize and reward collaboration between universities and industries;
- NSERC posted a guide on its Web site to help researchers communicate more effectively with the public and created a Communications Committee to advise Council on how best to communicate with its various publics;
- Service delivery was improved through the Electronic Forms Project.

Council Member Heading Into Space

Julie Payette, Canadian Space Agency astronaut and NSERC Council Member, has been chosen by NASA to take part in the first Canadian visit to the International Space Station. The Space Shuttle *Endeavour* is scheduled to be launched in May 1999.

We are pleased to offer Ms. Payette our most sincere congratulations for a well-deserved appointment.

Council Membership News

As *Contact* was going to press, we learned that five new Members have been appointed to Council and three Members have been reappointed, all for three-year terms.

Drs. Gilbert Drouin (ORTHOFAB, Québec), John Grace (University of British Columbia), and Tom Hutchinson (Trent University) were reappointed.

The new Members of Council are:

Dr. Xiaoyi Bao, University of New Brunswick
Dr. Simon R.M. Jones, Aqua Health Ltd, Charlettown, PEI
Dr. Dana Schlomiuk, Université de Montréal
Dr. Nancy Sherwood, University of Victoria
Mr. Nityanand Varma, Consultant, Ottawa.

See the winter issue of *Contact* for information on the new Members.

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in Canada through a network. The CIAR was followed by the Ontario Centres of Excellence, which added the elements of significant industrial involvement and strategic planning, and extended the range of activity to include project research. The NCE program took these concepts to the national scale and added a broader range of possible topics. More recently, NSERC began to fund a small number of Research Networks (generally similar to NCEs but limited to natural sciences and engineering subject areas).

The existing NCEs deal with genetic diseases, bacterial diseases, microelectronics, telecommunications, sustainable forestry, innovative structures, tele-learning, medical information technology, robotics and intelligent systems, protein engineering, and wood-pulps. The scale of the NCEs is impressive. In 1996-97 they involved 48 Canadian universities and 13 abroad. Their partners were 466 companies, 43 hospitals, 105 federal and provincial government agencies, and also 105 other organizations. The number of researchers involved was 4200, including more than 900 university professors and close to 3300 students.

Experience has shown that on the average a network receives about $3.3 million per year from the NCE budget, and a roughly similar amount in cash and in kind from industrial and other partners. At the same time, the members of an NCE continue to receive individual grants from NSERC, MRC, or SSHRC that may add up to an amount comparable with the NCE contribution.

A given network is funded for seven years in the first instance, subject to a successful review in the fourth year. It may also compete for another seven years, once again subject to mid-term review. NCE funding is intended to decline during the second seven-year term and networks are encouraged to develop plans to become sustainable when their NCE funding expires at the end of 14 years (or earlier). Competitions are to be held every 3 1/2 years, with 25% of the budget becoming available for new networks each time.

Networks of Centres of Excellence is a slightly complicated but very accurate name. NCEs begin with the centres of excellence – the researchers and their teams, whether supported by the granting councils (NSERC, MRC, SSHRC) in the universities, or from other sectors, who have over the years achieved national and international recognition. At some point a group of such people from various sectors may decide to join their efforts in a network to achieve more than the sum of what they could do individually. They work together with those who are prepared to become partners and develop a strategic plan. Then they submit a Letter of Intent (LOI) to apply for NCE funding.

The groups with the most promising LOI are invited to submit full applications, and then these are put through the process of expert review, site visits, and a second stage of examination by a blue-ribbon Selection Committee. The preparation of an NCE proposal takes a great deal of time and effort on the part of many people: the applicants, the reviewers, the Selection Committee, and staff both at the universities and at the NCE office. But these are large and complex proposals, and they must be prepared and judged with great care.

The submissions are judged against five criteria: the excellence of the proposed research program, the planned contribution to the education of highly qualified people, the quality of the proposed network and partnerships, the measures proposed for the exchange of knowledge and exploitation of new technology, and the plans for managing the whole enterprise. The research areas might be targeted, or left open as they have been for the current competition.

I have a concern with the current competition, but it is not with the quality of the submissions. I have read some excellent proposals for exciting research that meets real and pressing needs in Canada, submitted by groups of proven quality that fully understand what the NCEs are meant to accomplish. My concern, on the contrary, is that a number of these splendid applications will be turned away because the budget for the competition is too small.

Because of commitments to existing networks and the phasing in of the new funding pattern, the amount available in the current competition is about $9 million per year. That means that we already know that only two or three networks can be funded out of 11 full applications. And those 11 applications emerged from the first stage of the competition in which 72 Letters of Intent were considered. Three out of 11 (27%) is a low success rate, but it may be argued that the actual success rate is much lower still: 3 out of 72 (4%)! That kind of number can only discourage the best and busiest researchers from applying to the NCE program, and Canada can't afford that.

When the current competition is finished, we will have perhaps 13 or 14 NCEs. On the basis of what I have seen in the NCE competitions, I believe that Canadian researchers today have the capacity to create twice that many networks of excellent quality.

For that reason, I have been urging that the annual budget of the NCE program be increased to $100 million through a new investment by the federal government in the next Budget. That will make it possible to have more frequent competitions, to broaden the range of research areas, and to move to a steady state of about 30 NCEs. At that level, this wonderful Canadian institutional innovation will more adequately realize the nation's growing potential to do what government and the research community agree is essential for our future: promote the best of research, and help our brightest people use research to improve the lives of all Canadians.

Councils Release Joint Policy Statement on Ethical Conduct for Research Involving Humans

The Medical Research Council (MRC), the Social Sciences and Humanities Research Council (SSHRC) and NSERC released a joint policy statement on Ethical Conduct for Research Involving Humans September 17. All researchers and institutions that receive funds from the Councils need to adhere to this new Tri-Council Policy Statement, which replaces the separate policies that had been in place since the 1970s.

The policy statement sets out the operational requirements for institutional Research Ethics Boards, such as the need for independence from institutional and researcher interests, standards of record keeping, mechanisms of interaction with researchers, and continuing review of research once approved.

The review process will take a proportionate approach: the more invasive the research, the greater will be the diligence in assessing the research. It will seek to minimize the risks to research subjects while maximizing the benefits that arise from the research. Based on the principle of respect for human dignity, the policy also provides guidelines on free and informed consent, privacy and confidentiality, conflict of interest, participation of vulnerable persons, and balancing harms and benefits.

According to Dr. Brock Fenton, Associate Vice-President (Research and Faculties) at York University,

> *"We need this policy and framework because research involving humans has the potential to deliver extraordinary benefits to people but only when the work is conducted under the most scrupulously controlled conditions. Whether the issue is conflict of interest or the many other situations that can arise and bedevil a research endeavour, the perception of the scene may be as important as the reality."*

The Councils have asked research institutions to examine their current ethics review processes and inform them, by December 15, 1998, whether they meet the requirements of the new policy or need more time to prepare. All institutions are expected to have the new policy in place by September 30, 1999.

To help institutions, researchers, and Research Ethics Boards in the implementation of the policy statement, the National Council on Ethics in Human Research (NCEHR) will organize workshops and site visits, and develop educational materials.

This statement is the result of four years of consultations between the three Councils and the academic community, and includes input from the research community.

> *"The document's utility is a credit to the group that produced it and the efforts that members of the research community contributed in commenting on earlier drafts," says Dr. Fenton.*

The policy statement identifies common fundamental principles for research involving human subjects in the various disciplines funded by the Councils and offers updated and acceptable standards and procedures to govern this research. It balances the need to advance knowledge with the need to respect existing moral, social, and legal principles. The outcome will be to harmonize ethical requirements for all research involving human subjects.

We welcome your comments. Copies of the policy statement can be obtained from NSERC's web site, at *www.nserc.ca/news1.htm.*

Canada Foundation for Innovation Invests $36 Million in Infrastructure Support

Dr. David W. Strangway, President and CEO of the Canada Foundation for Innovation (CFI), announced in August that the Foundation was investing $36 million to provide infrastructure support to new researchers.

Dr. David W. Strangway took up his new position as CFI President and CEO on June 1. He succeeded the founding President, the late Dr. J. Keith Brimacombe. Dr. Strangway is past President and Vice-chancellor of the University of British Columbia.

Awarded through the CFI New Opportunities program, the funds will help launch the research careers of more than 400 new faculty members in 26 universities across Canada.

Following its established funding formula, the CFI supports, on average, 40 percent of the selected infrastructure projects. The remaining costs are supported by funding partners in the public, private, and voluntary sectors. Therefore, the CFI investment of $36 million and the partner contributions represent approximately $90 million in research infrastructure for new faculty in Canadian universities.

The overall success rate of the New Opportunities competition was 71 percent, of which 51 percent is in health, 22 percent in science, 18 percent in engineering, and 9 percent in environment.

More information on the competition can be obtained from the Foundation's Web site, *www.innovation.ca.*

New Opportunities Awards by Institution

Alberta	17	Montréal	23
Calgary	10	Ottawa	11
Carleton	1	Queen's	7
Concordia	2	Saskatchewan	2
Dalhousie	4	Simon Fraser	5
École Polytechnique	1	Sherbrooke	7
Guelph	4	Toronto	23
INRS	3	UBC	18
Laval	14	Victoria	3
Manitoba	7	Waterloo	11
McGill	17	Western	10
McMaster	7	Windsor	1
Memorial	3	York	3

Four Networks of Centres of Excellence to Receive Continued Funding

On July 21, Dr. Tom Brzustowski, Chair of the Steering Committee for the federal Networks of Centres of Excellence (NCE) program, announced that four existing networks will receive more than $35 million in continued funding.

According to Dr. Brzustowski, "Canadians are getting a high return for their investment in the Networks of Centres of Excellence, in terms of economic benefits and social gains." He added, "Those four networks are training the next generation of scientists and bringing researchers who generate new knowledge into close contact with those who use knowledge productively. They are key to preparing Canada for the knowledge-based society of the new millennium."

Established in 1995, the four networks underwent an independent, mid-term review by four expert panels in May and June. Following a positive assessment by each panel, the NCE Steering Committee made the decision to extend the grants of the following four networks to the year 2002:

- The **Health Evidence Application and Linkage Network (HEALNet)** carries out multidisciplinary research to better the health and wealth of Canadians by improving decision-making at all levels in the health care system.
- The **Intelligent Sensing for Innovative Structures Network (ISIS Canada)** is developing Canadian civil engineering and construction capability to a world leadership position.
- The **Sustainable Forest Management Network (SFM)** is pursuing research aimed at managing the nation's forests while preserving their inherent ecological function and biodiversity.
- The **TeleLearning Network of Centres of Excellence (TeleLearning-NCE)** research focuses on new ways to use networked computer environments and tools for education and training.

To learn more about the goals and objectives of the NCEs, see highlights of the above four networks, and find the latest press releases and NCE success stories, visit the NCE Web site at *http://www.nce.gc.ca*, which has links to each NCE web site.

Visit *www.nserc.ca* Regularly

Be sure to check NSERC's Web site regularly for fast-breaking news. As a print medium that comes out just four times a year, *Contact* can't always keep up with the pace of change. Policy announcements, lists of award holders, program changes and other NSERC news is often posted on the Web weeks before it reaches you via *Contact*.

NSERC Launches New University Faculty Awards Program

NSERC's new University Faculty Awards (UFA) program is designed to encourage Canadian universities to appoint very promising women researchers to tenure-track or tenured positions in science and engineering.

The awards will be tenable for 5 years (3 years, plus 2-year renewal upon satisfactory review). NSERC will contribute $40,000 per year toward the award holder's salary and will guarantee a minimum research grant for each year of the award. The initial research grant will also be for three years and the Grant Selection Committee in each discipline will determine its value.

To be eligible, nominees must be women, Canadian citizens or permanent residents of Canada and hold, or expect to receive by the time of appointment, a doctorate in one of the fields of research supported by NSERC.

The deadline date for applications is January 1, 1999 (November 1 in subsequent years). Successful candidates in this first competition will be notified in March and must take up their awards between April 1 and September 1, 1999.

For more information, visit our Web site (*www.nserc.ca/programs/sf/UFA_e.htm*) or contact Diane Séguin in the Scholarships and Fellowships Division by phone at (613) 996-6348, or by e-mail at dzs@nserc.ca.

Merger Creates New CRD Grant

To streamline its university-industry project funding, NSERC has merged its Industrially-Oriented Research (IOR) and Collaborative Research and Development (CRD) grants under the CRD umbrella.

The new program will span a broad spectrum of activities from basic to applied research, and proposals that would have been submitted as IORs will now be accepted as CRDs. Having a single grant type will simplify the application and administration processes while still allowing for traditionally flexible and responsive program delivery.

The new program is expected to result in more tightly defined projects that better meet the existing criteria for U-I projects – the merits of the proposal, the expertise of the project team, the industrial relevance and economic potential, and the participation of the industrial partner. Training opportunities and experience for project personnel remain a priority.

Among the changes anticipated are greater attention to the need for work plans, milestones, and deliverables, and rationales for the proposed expenditures and the eventual economic benefits.

Details of the implementation of the new program are being worked out, and will be available shortly on our Web site (*www.nserc.ca/news1.htm*).

For more information, contact the University-Industry Projects Division at (613) 996-1898, or send an e-mail to rpp@nserc.ca.

Two Pilot Programs of Interest to Industry Approved for Continuation

As a means of enhancing university-industry partnerships, Council has approved the continuation of two pilot programs. The decision follows Finance Minister Paul Martin's budget announcement (see summer issue of Contact for budget details) in which he stipulated that new resources for NSERC focus on two key areas: increased support to graduate students engaged in research, and enhanced partnerships between universities and industry.

Intellectual Property Management (IPM) Program

NSERC funding to support industry liaison office (ILO) activities has given a big boost to universities' abilities to deal with the issues involved in commercializing university research. Twenty IPM awards involving 34 universities have put $5.4 million into the system over the past three years. This new funding has enabled additional professional staff to be hired, and allowed staff to receive further training. Funds were also used to identify, assess, and demonstrate inventions, and to protect intellectual property.

The evident benefits to the awardees in the first round convinced Council to provide $3 million a year to continue the program. A competition will be held this fiscal year for new and renewal awards to support outreach, technology transfer, and commercialization activities. Applications will be accepted from University Research Grants or Industry Liaison offices by December 1, 1998.

An advisory group including representatives of the universities and other sectors has been set up to review the program and advise NSERC on possible changes. Full details on the IPM program, including application requirements, will be available shortly, and can be found on NSERC's Web site (*www.nserc.ca/news1.htm*).

For further information contact Margaret Caughey at (613) 996-4993 (e-mail: mec@nserc.ca)

Technology Partnerships Program

The Technology Partnerships Program (TPP) started as a pilot program in the spring of 1994. Its goal was to assist small and medium-sized Canadian companies to turn university-generated technology into commercial products or services. The TPP trial period extended to the end of 1997, and resulted in 40 projects being initiated. While most of these are still under way, very positive assessment of the early results and strong community support led to Council's decision at its June meeting to continue the program. Funding of $3 million a year has been allocated to the program.

NSERC has sought advice from the community on refinements to the TPP, drawing on the experience and the lessons learned by the companies, the researchers, the industry liaison offices and NSERC itself during the first years of the program. Substantive changes are not anticipated, and efforts will be directed toward improvements in response time and clarifying the requirements for successful submissions.

TPP proposals require partnership with a Canadian firm with the capacity to take the project results successfully to market. A well thought out business plan is an essential part of the application. Projects are adjudicated by a multidisciplinary project review committee that includes individuals with broad business experience as well as scientific and technical expertise. TPP proposals may be submitted at any time. Full details on the TPP, including application requirements, will be available shortly, and can be found on NSERC's Web site (*www.nserc.ca/news1.htm*) Application kits are available from University Research Grants or Industry Liaison offices.

For further information contact:

Margaret Caughey at (613) 996-4993 (e-mail: mec@nserc.ca), or Christiane Villemure at (613) 996-2145 (e-mail: cmv@nserc.ca).

Managing Technological Change

Joint Program Renewed

The NSERC-SSHRC Chairs in the Management of Technological Change program has been renewed for a further five years with a combined annual budget from the two Councils of $1.8 million.

The program emphasizes the interdisciplinary approaches that integrate science and engineering with the social sciences. Funding from the private sector is required.

1998 Competition Results

Two new chairs were recommended for funding in the competition held in March.

Dr. Bill Leiss is expected to take up his Chair in the *Management and Communication of Risk as a Public Policy Issue* at the University of Calgary in the coming months. His research program is aimed at understanding the factors that impede, and the practices that encourage, the more effective communication of risks that result from developing and using industrial technologies.

Memorial University is searching for a suitable candidate to occupy its Chair in *Youth-Focused Technological Entrepreneurship*, which was approved in principle. Its aim is to ignite an entrepreneurial spirit in Canada's post-secondary system and to lever rural community support for new technology-based enterprises.

These two incumbents will join 13 other chairholders who are trying to explore and explain the nature of technological change and figure out how to manage it effectively.

Upcoming 1999 Competition

The December 15 deadline for the next competition for these chairs is fast approaching.

Full details on the program and the application procedures can be obtained from either Council, from university research grants offices, and from the Web, at *www.nserc.ca/programs/resguide/chair.htm*.

For further information contact:

Margaret Caughey, NSERC, at (613) 996-4993
(e-mail: mec@nserc.ca) or

Patricia Dunne, SSHRC, at (613) 992-5305
(e-mail: pxd@sshrc.ca).

Fund Promotes New International Research Collaborations

NSERC has created a new program that will help Canadian researchers to take advantage of emerging international research opportunities of significant benefit to Canada. Up to $500,000 has been set aside this year for the International Opportunity Fund (IOF); by 2000-01, $1.5 million will be made available.

The Fund will help researchers to establish collaborative projects with research groups or networks abroad and enable them to participate in major international programs. It is designed to support the non-research costs associated with international research activities – costs that are not suitable for funding from other NSERC programs.

IOF grants will cover the costs associated with long distance interactions or the organization of international workshops aimed at developing a research program or project. The duration of support and amount granted will depend on

the nature of the project; however, the Fund is intended as a mechanism for short-term support of three years or less. While travel costs may be part of the overall project costs, IOF grants are not to be regarded as travel grants. Researchers may hold IOF grants concurrently with other NSERC grants.

The program is intended to be flexible and responsive. Applicants can submit proposals at any time and will receive a timely response from NSERC.

Collaborative proposals involving Canadian partners from academia, industry and government are strongly encouraged; however, funds will be awarded only to researchers eligible for NSERC grants.

Program details are still being finalized, but will be available soon on our Web site at *www.nserc.ca/news1.htm*. In the meantime, call (613) 995-7752 or 995- 6378, or send an e-mail to scw@nserc.ca.

Coming Up: The Millenium Timebomb

The millenium is just around the corner. It will be the first time most of us have encountered a new century, so we're looking forward to it with anticipation. However, it will also be the first time for computer-based information systems, and evidence shows that up to 90% of them may not be able to cope with it.

Do you know if your computer systems and databases are Year 2000 compliant? If they aren't, now is the time to do something about it.

In the winter issue of Contact, we'll outline the problem and tell you where you can find out more information on Year 2000 activities, plans and issues.

Winning Partnerships

University - Industry Synergy

An exciting feature of the 1998 Innovation Conference, being held November 4 and 5 in Halifax, is the presentation of the University-Industry Synergy R&D Partnerships Awards. Sponsored by The Conference Board of Canada and NSERC, the awards recognize outstanding examples of university-industry R&D collaboration for commercialization and wealth creation.

The winning partnerships are:

- *Université Laval and Les matériaux de pointe Précitech inc.*
- *the University of Waterloo and Certicom Corporation*
- *the University of Windsor and Chrysler Canada Ltd.*
- *the University of New Brunswick and Fraser Papers Inc.*
- *the University of British Columbia Pulp and Paper Centre, and OpTest Equipment Inc. and the Pulp and Paper Research Institute of Canada (Paprican)*
- *IRIS and PRECARN Associates*
- *Carleton University, the University of Toronto, and the University of Calgary, and Nortel Networks.*

Their achievements will be highlighted in the winter issue of *Contact*.

For more information on the Innovation Conference, call Dina Derenzis at The Conference Board of Canada, 1-800-267-0666 or (613) 526-4249; for more information on the awards ceremony, call Viviane Dugas Patry at NSERC, (613) 995-2147.

Research Profile

World Watches SNO

World-renowned scientist Stephen Hawking was on hand in Sudbury earlier this year to help Canada celebrate the inauguration of one of its biggest-ever science projects – the Sudbury Neutrino Observatory (SNO). The event was also attended by Industry Minister John Manley, Secretary of State (Science, Research and Development) Ronald Duhamel and NSERC President Tom Brzustowski, along with other federal ministers and prominent scientists and representatives of government and industry from Canada, the United States and the United Kingdom.

Dr. Hawking's presence at the launch of the SNO project generated tremendous interest around the world. In Canada, the event was covered by all the major news networks and feature articles appeared in newspapers and magazines. The inauguration also involved a live Internet video conference allowing people to question SNO scientists about the experiment.

SNO's mission is to glimpse the most abundant yet elusive subatomic particle in the Universe – the neutrino. Born in the nuclear furnaces of stars, trillions of them stream from our sun every second. Others are vestiges of the primordial explosion that began the Universe, still others are created in supernovae and in nuclear power plants, where much of the fuel's energy is taken away by neutrinos. They pass through almost everything, and rarely interact with other matter.

Everything about the laboratory is designed to maximize the chances of recording neutrino events. Located in the deepest part of the mine, the facility is shielded from cosmic rays that might interfere with observations. All of the components are ultra-clean to prevent other background radiation from masking the neutrino signals. At the heart of the observatory is an acrylic vessel containing 1000 tonnes of heavy water, which is suspended in a large pool of ultra-pure normal water. When the facility becomes fully operational towards the end of the year, a dozen or so of the trillions of neutrinos passing through the vessel each day are expected to interact with the heavy water. This will result in weak flashes of light called Cherenkov radiation. These will be detected by some of almost 10,000 photomultiplier tubes, each individually aimed, and mounted in a geodesic array that surrounds the vessel.

The SNO experiment will be sensitive enough to detect not only ordinary neutrinos, but other rarer varieties. It offers an opportunity to determine how strongly the different types mix together, as well as their masses. The answers are expected to fill large gaps in theories about the development and ultimate fate of the universe.

The construction of SNO is a major technological feat and the culmination of many years of collaboration between scientists, institutions and countries. The $75 million required by the project was shared by the Government of Canada, the Province of Ontario, the US Department of Energy, and the UK Particle Physics and Astronomy Research Council. NSERC helped provide the initial scientific evaluation of the project and has played a guiding role in its development. NSERC, Industry Canada, NRC and FedNor (Federal Government's Economic Development Initiative in Northern Ontario) together contributed $47 million toward the construction of the observatory.

More information and pictures can be found on the SNO Web Site (*http://www.sno.phy.queensu.ca*)

Stephen Hawking Makes the Case for Basic Research

Editor's Note: Following is the presentation by Professor Stephen Hawking, Lucasian Professor of Mathematics at Cambridge University, on the occasion of the opening of the Sudbury Neutrino Observatory, April 28, 1998.

It is a great pleasure to be here for the opening of the Sudbury Neutrino Observatory. I won't go into what the SNO project will tell us because other people have done that. But the results of SNO will be important for fundamental science so I want to talk about why we should care about basic research and why governments should support it with public money. The answer comes in two parts: the first is that most of the wealth creation and general improvement of living standards has come about through advances in basic science. For example the whole electronic industry including television and computers is based on solid state physics. This in turn is based on Quantum Mechanics and the Dirac equation for the electron. Dirac was my predecessor but one of the Lucasian Professors at Cambridge. Another example is the biotech industry. This is based on the discovery of the structure of DNA by Crick and Watson and other work on molecular biology in Cambridge and elsewhere. In neither case did the fundamental research seem to have any commercial application at the time it was performed, so it would not have been supported on any strict test of economic return. No private company could have financed it. Yet these two examples must have generated over a trillion dollars each.

Only governments can take a long-term view and invest in research that will not pay off for many years or research that will benefit the whole world rather than just the shareholders of one company. Of course, one could say, "Why should my government fund basic research? The results will be published and available to everyone. Why can't we leave it to other countries to pay for basic research and just use what they find?" The answer is that doing research in fundamental science builds up a strong academic tradition and a body of trained people who can react quickly to new developments. If you leave the fundamental research to other countries, you won't have the scientific base.

But the case for basic research is more than that one might hit the jackpot by chance. There is fundamental research that one can be fairly sure will not produce an economic return in the next hundred years yet it is worth supporting because it expands our horizons and increases our knowledge of the Universe. The advances we have made since cave person days have been driven by human curiousness and the wish to understand the Universe around us rather than the desire to make money. This need to know where we come from and where we are going is even greater now that we don't have the religious certainties we once had.

In the past, communities devoted a significant portion of their income to the construction of temples, cathedrals and other monuments to the intangible. Fundamental research is the modern equivalent. It will enable us to fulfill our destiny as maybe the only intelligent beings in the galaxy. Don't let us blow it by skimping on basic research.

Industry Canada photo

Joining Stephen Hawking at the SNO inauguration are, from left to right: Ronald Duhamel, Secretary of State (Science, Research and Development); Ray Bonin, M.P., Nickel Belt; and John Manley, Minister of Industry.

Policy on Research Grants Funding Overlap Clarified

Most researchers today get funding from more than one source. This can create problems for NSERC's Grant Selection Committees (GSCs), which not only have to evaluate the need for funds but also have to ensure there is no overlap in the funding.

The issue of "overlap" is an important one for the Medical Research Council (MRC) and the Social Sciences and Humanities Research Council (SSHRC) as well, since often the funding overlap is with another granting council. Following the 1997 Research Grants competition, a working group with an equal number of members appointed by MRC and NSERC was established to look into the issue.

As a result of the group's findings, NSERC decided that while there was no need to change its existing policies on overlap, there was a need to clarify and explain them so that the Council's position on overlap is clear to both applicants and GSC members. In brief,

Researchers applying in the 1999-2000 Research Grants competition should keep the following key points in mind:

- They must apply to the council that deals with the dominant research discipline.
- They may not submit the same application to NSERC and MRC or SSHRC.
- NSERC expects that there will be no duplication of funding for the same research.
- The onus is on the applicant to provide sufficient information to enable a review committee to recommend the appropriate NSERC funding level. The applicant must describe both the conceptual and the budgetary relationships of the proposed research to currently held or applied for support.

GSC members should use the following principles when they are examining Research Grant applications in which the applicant has other sources of funding:

- Access to NSERC Research Grant funds should be fair for all applicants, regardless of whether or not they have other sources of funding.
- All applications must be evaluated according to the four review criteria: namely, scientific or engineering excellence of the researcher, merit of the proposal, need for funds, and contribution to the training of highly qualified people.
- There should be no duplication of funding for the same research.

NSERC is reviewing its publications – the *NSERC Researcher's Guide, the Application for NSERC Grants kit* and the *Application for a Grant (Form 101)*, as well as *the Peer Review Manual* – for the 2000-01 competition, to ensure that its position on overlap is clear to both applicants and GSC members.

Reminder to NSERC Grant Applicants

During the past year, NSERC has made some changes to the procedures, rules and regulations governing certain grants programs. These changes took effect in September and are outlined in the following publications:

- *Addendum to the NSERC Researcher's Guide 1997*
- *Addendum to the Application for NSERC Grants 1997.*

You can access the Guide, the addenda, and Forms 100 and 101 (JetForm versions and PDF format) from our Web site: *www.nserc.ca/programs.htm.* You can also obtain copies from your university Research Grants Office or order them by e-mail from distribution@nserc.ca.

Research Update

Strengthening Canadian Expertise in Rubber Technology

Bayer Inc. and NSERC have teamed up to create an Industrial Research Chair in Elastomer Technology at the University of Western Ontario. The new chair will provide the Canadian rubber industry with a world-class pool of experts to draw from. Bayer will provide $750,000 over five years and NSERC will contribute more than $700,000. Chairholder Judit Puskas, a specialist in cationic polymerization, is a member of Western's Department of Chemical and Biochemical Engineering. She will conduct research that is expected to lead to improved elastomer manufacturing processes and to the design of new, efficient, and environmentally friendly processes and materials.

Elastomers, whether synthetic or natural, are substances with the ability to recover their original shape, just like a rubber ball. They are found in numerous products Canadians use every day, such as car tires and running shoes, as well as in large-scale industrial and commercial processes.

UWO Chair announcement at the Bayer Exhibit of the Ontario Science Centre in North York, Ontario. From left to right: Mohan Mathur, Dean, Engineering Science, UWO; Judit Puskas, chairholder; Heinz Greve, VP Technology, Bayer Inc.; Joe Fontana, MP, London North Centre; and Gerry Margaritis, Chair, Chemical and Biochemical Engineering, UWO.

Despite its important role in our economy, elastomer technology has never been the focus of a formal university research or teaching initiative. Thanks to the Chair program, new courses in elastomer technology will be introduced into the undergraduate and graduate curriculums at Western. Dr. Puskas' lab in the University's Macromolecular Engineering Research Centre will employ undergraduate and graduate students as well as postdoctoral fellows.

"It is fitting that the establishment of this chair be supported by Bayer, in whose laboratories the discover of synthetic rubber was made in 1910," said David Hellenbrand, President and CEO of Bayer Inc., who was on hand for the announcement. "As a global company committed to R&D, Bayer supports science education and stresses the importance of innovation, with the goal of developing high performance, environmentally compatible products."

Developing New Anticancer Compounds

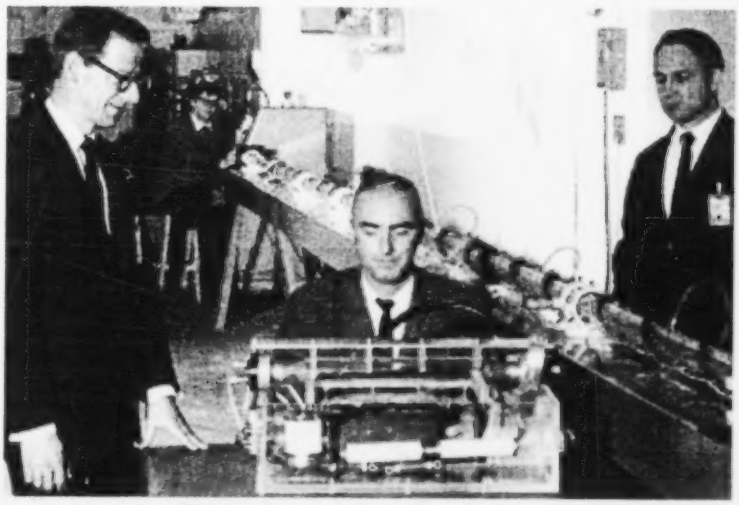
Dr. Chris Orvig, from the Department of Chemistry at the University of British Columbia, has been awarded a $263,500 collaborative research and development grant over the next three years to develop vanadium compounds for the treatment of cancer.

The grant will support research at UBC in association with industrial sponsor Angiotech Pharmaceuticals, whose drug development program is aimed at bringing new cancer therapies from the laboratory bench into the clinic. Angiotech scientists have demonstrated that novel compounds, based on the metal vanadium, are highly effective in reducing tumor growth in mice. An important feature of vanadium compounds is their effectiveness against tumor cells resistant to other anticancer drugs. The CRD research is expected to lead to new cancer therapies with improved formulation characteristics, superior therapeutic activity and reduced side effects.

Angiotech Pharmaceuticals, Inc. is a Canadian pharmaceutical company engaged in the development and commercialization of novel treatments for such diseases as rheumatoid arthritis, restenosis, cancer, multiple sclerosis and psoriasis.

Defence Research & Development Celebrates 50 Years of Excellence

Editor's Note: Over the past five years, NSERC and the Defence R&D Branch of the Department of National Defence have jointly supported Canadian university researchers through the Council's Industrial Research Chairs program and Research Partnership Agreements with Canadian Government Departments and Agencies program. On the occasion of the Branch's 50th anniversary, we are pleased to offer our congratulations and to publish the following article submitted by the Department.



Some of the members of the Project LOTION team that was awarded the gold medal of the Professional Institute of the Public Service of Canada for discovering the TEA-CO2 laser. From left to right: Dr. Jacques Beaulieu, Mr. Martin Hale and Dr. Maurice Gravel. In the background: Mr. Gilles Boily.

The Defence R&D Branch in the Department of National Defence is celebrating its 50th anniversary, marking five decades of scientific and technological innovation and leadership. Defence R&D has contributed significantly to wealth generation in Canada, and has provided opportunities for industrial development as well as employment.

"Your achievements over the latter half of this century have saved lives, spawned new technologies and created jobs and wealth for Canada," writes Prime Minister Jean Chrétien about the Branch. "Your vision and leadership have been an integral part of the success of the Canadian Forces and brought honour to our country."

The Branch's beginnings date back to the Second World War. The Department of National Defence called on scientists, engineers, technicians and others from industry and universities across Canada to come together in the war effort. They went to work in laboratories and experimental stations seeking to provide our troops with the best technology and advice possible. While the facilities were often less-than ideal, the results were amazing. The Defence Research Board (DRB) was officially established in the late 1940s under Dr. Omond Solandt, and it continued to grow in size and reputation over the following decades. In 1974 the DRB was disbanded and the Chief of Research and Development (CRAD) Branch was formed.

Starting in World War II with such technology as the Franks Flying Suit, the world's first "G" (gravity) suit, the Branch has been an important contributor to military technology in the air, on land and at sea. Among its hundreds of innovations have been a system that prevents the corrosion of ship hulls, a nerve agent antidote, an air-to-ground rocket weapon system yet to be surpassed by any other nation, and some of the most advanced mine-clearing technology in the world.

"The men and women of the Defence Research Board and the Defence R&D Branch have helped ensure the continuing effectiveness of the Canadian Forces and have established a position of respect for Canada among the scientific organizations of our allied countries," says Dr. John Leggat, Chief of Research and Development.

Although the Branch continues to nurture its close ties with its main client, the Canadian Forces (CF), its work has also led to excellent scientific and technological achievements having a variety of non-military applications. These developments, accomplished hand-in-hand with private industry and research facilities, have often led to success for Canadian industry.

Early aerospace research paved the way for Canada's current role as a world leader in space science and exploration. Advances in rocket technology led to new ways to monitor air quality from the Earth's upper atmosphere. Studies in military medicine gave us cold weather survival techniques, new polymers to treat burns, and an artificial blood product, to name a few.

Another recent accomplishment was the adapted water-cooled garment that aircrew wore under chemical protective flight gear during the Gulf War. The technology allowed Canadian helicopter crews to fly missions twice as long as those of their allied counterparts. It was so highly praised by pilots that the U.S. Air Force awarded a contract to a Canadian company to outfit U.S. fighter jets with the new system.

Today the R&D Branch includes five Defence Research Establishments across the country: Defence and Civil Institute of Environmental Medicine, in Toronto; Defence Research Establishment Atlantic, in Dartmouth, N.S.; Defence Research Establishment Ottawa, in Shirleys Bay, Ont.; Defence Research Establishment Suffield, near Medicine Hat, Alta.; and Defence Research Establishment Valcartier, near Quebec City. This makes it one of the most diversified and broadly based scientific organizations in the country.

Recent organizational changes have helped the Branch reach out even further to the private sector and other S&T organizations. The creation of a new Business Development Office will continue to improve the Branch's new orientation. By keeping abreast with the changing roles of Canadian Forces and the opportunities presented by emerging technologies, the Branch is ready to meet the challenges of the new millennium and beyond.

For more information, contact *Robert Ashe, Senior Communications Officer*, Defence R&D Branch, by telephone at (613) 992-7281, or by e-mail at robert.ashe@crad.dnd.ca.

NSERC Publicity Material the Latest Rage!

NSERC promotional materials took six prizes at the Advertising and Sales Association of Ottawa's annual presentation of awards in June. Ads on the research of Drs. Andrew Weaver, John Long and Line Rochefort each won an award and the series took the top honour in the Magazine Campaign category. In the Brochure category, Bringing Discovery & Innovation to Life *won an award of merit, and it also won an award in the illustration category.*

The campaign was designed to show Canadians how they and Canada's economy have benefited from NSERC's investments in research. The resulting brochure and ads focused on the discoveries and innovations that directly affect our everyday lives.

You can view the ads and brochure on our twentieth anniversary Web page (*www.nserc.ca/20/years.htm*). The ads are appearing this fall in *The Globe and Mail Report on Business Magazine*, the *Financial Post Magazine*, and *Les Affaires*.

Fall Supplements Celebrate NSERC's Twentieth Anniversary

Thanks in large part to our industrial and university partners, NSERC will get lots of print coverage this fall. A 24-page insert in the November issue of the *Financial Post Magazine* will feature articles on the importance of research and the upcoming Synergy conference in Halifax. A similar venture is being planned with *Les Affaires*.

Targeted Areas for Strategic Project Grants Unchanged for 1999 Competition

At its meeting in June, Council agreed that the targeted areas in place for the 1996, 1997 and 1998 Strategic Project grant competitions would continue for the 1999 competition.

Strategic Project grants fund pre-competitive, pre-commercial research projects that involve the active participation of partners from business, government or non-profit organizations. Projects in any area with the potential for economic, social or environmental benefit to Canada are eligible for support; however, Council has targeted certain areas for acceleration by setting a higher success rate in these areas. The targeted areas, which are described in the *NSERC Researcher's Guide* (Appendix 7) are:

- Information Technologies
- Biotechnologies
- Environmental Technologies
- Materials Technologies
- Manufacturing and Processing Technologies, and
- Energy Efficiency Technologies.

The selection of the targeted areas is based on the expected economic and social benefit to Canada, the existing research capability in the universities and the anticipated need for people trained in the area.

NSERC is conducting an evaluation of the Strategic Projects element of the Research Partnerships Program; Management will examine the results within the context of other NSERC program elements and recommend modifications if required. The last Strategic Projects evaluation was carried out in 1987.

Writer Honoured

NSERC public affairs officer Arnet Sheppard presented the 1997 Science in Society Journalism Award to Vivien Bowers, winner in the Children's Book category, at an awards banquet on May 30. NSERC is one of twelve sponsors of these annual Canadian Science Writers' Association awards.